

Scientific Note

**HOST RANGE EXPANSION OF
HELCASTIZUS RUFISUTUM CUSHMAN
(HYMENOPTERA: ICHNEUMONIDAE) TO
PHORACANTHA SEMIPUNCTATA FABR.
(COLEOPTERA: CERAMBYCIDAE) IN CALIFORNIA**

The eucalyptus longhorned borer, *Phoracantha semipunctata* Fabr., was first discovered in southern California in 1984, and during the last decade has decimated eucalyptus stands as it has spread throughout the southern counties, northwards through the San Joaquin and Sacramento Valleys and up the California coast (Scriven, G. T., E. L. Reeves & R. F. Luck. 1986. Calif. Agric., 40: 4-6; Paine, T. D., J. G. Millar & L. M. Hanks. 1995. Calif. Agric., 49: 34-37). Prior to this introduction, there were no North American *Phoracantha* species. As part of a biological control program aiming to limit damage caused by *P. semipunctata*, we have imported and introduced from Australia several species of braconid parasitoids of *Phoracantha* larvae (Paine et al. 1995). In particular, the parasitoid *Syngaster lepidus* Brullé showed promise of establishing at a site in Santa Barbara County, with several hundred wasps emerging from a single borer-infested tree a few months after release of 4,500 lab-reared wasps in summer 1994. On 11 Nov 1995, we monitored establishment of this parasitoid by looking under the bark of *Eucalyptus globulus* LaBillardiére logs for the symmetrically oblong cocoons at the ends of *P. semipunctata* feeding galleries, but instead discovered a considerable number of very different, irregularly-shaped cocoons (one per borer gallery). Nine ichneumonid parasitoids of the species *Helcostizus rufiscutum* Cushman emerged from these cocoons in the laboratory (5 females and 4 males). *Helcostizus rufiscutum* is native to California and has apparently expanded its host range to become either a primary parasitoid of *P. semipunctata* or a secondary parasitoid of *S. lepidus*. Voucher specimens of *H. rufiscutum* have been placed in the Entomology Teaching and Research Museum at the University of California, Riverside.

Helcostizus rufiscutum belongs to the subfamily Cryptinae and tribe Hemitelini, other species of which are parasitic on cocoons of small insects in several insect groups, including Coleoptera and braconids (Townes, H. 1983. Mem. Am. Entomol. Inst., 35: 1-281). That the natural hosts of *H. rufiscutum* are apparently wood-boring larvae or their parasitoids is indicated by emergence of adult parasitoids from logs of the coniferous trees Monterey Cypress (*Cupressus macrocarpa* Gordon) and Douglas Fir (*Pseudotsuga menziesii* [Mirbel] Franco) as well the woody angiosperm poison oak (*Toxicodendron diversilobum* [Torrey & A. Gray] E. Green) (Townes 1983). It is clear that *P. semipunctata* was the host in Santa Barbara because *S. lepidus* was too rare at the site to account for the abundance of *H. rufiscutum*. For example, an intensive search of the study site on 11 Nov 1995 yielded only a single empty *S. lepidus* cocoon among hundreds of borer larvae. On 6 Aug 1996, we saw no evidence of *S. lepidus*, but counted 47 *H. rufiscutum* cocoons and 11 borer larvae (a parasitism rate of 81%). More-

over, we have tested the ability of *H. rufiscutum* to develop on *P. semipunctata* larvae in the laboratory; caged adult females readily oviposited on borer larvae through the bark of eucalyptus logs, and adult parasitoids emerged about 1 month later. Although all the parasitoids that emerged were males, this sex bias was likely due to either inhibition of mating behaviors in lab cages or to the size of host larvae that were provided. Field-collected cocoons yielded both sexes.

Host range expansion by *H. rufiscutum* is probably the result of a combination of factors. First, adult *H. rufiscutum* may search for a potentially broad range of borer hosts in a variety of habitats, as indicated by its being collected from a diversity of woody plant types. Second, location of the cryptic host insects is apparently mediated primarily by acoustic or vibrational cues that are detected by organs in the swollen front tibiae of females (J. Luhman, pers. comm.), and these cues may be similar for different borer species. Third, natural hosts and habitats were in close proximity to eucalyptus trees and slash infested with *P. semipunctata* larvae; all of the woody plant species from which this parasitoid has been reared (Monterey Cypress, Douglas fir, Poison Oak) occur in Santa Barbara County (Hickman, J. C. 1993. *The Jepson Manual*. Univ. of California Press). However, it is not known which species of wood borers are the native hosts. One possibility is *Xylotrechus nauticus* (Mannerheim) which commonly infests a wide variety of woody hosts (Linsley, E. G. 1964. *Univ. Calif. Pub. Entomol.*, 22: 1-197). *Xylotrechus nauticus* larvae also feed in eucalyptus logs (Solomon, J. D. 1995. U.S.D.A. For. Serv. AH-706), and may occur in the same host logs as *P. semipunctata* (LMH, pers. obs.), suggesting a simple behavioral mechanism leading to parasitism of this introduced borer. Feeding galleries of *X. nauticus* may be distinguished from those of later instar *P. semipunctata* by their narrower breadth.

In Santa Barbara, *H. rufiscutum* apparently parasitizes a significant proportion of *P. semipunctata* larvae and so may play an important role in reducing borer populations. This parasitoid may also attack a congeneric borer species, *P. recurva*, which has been recently discovered in the state, but only in Orange, Riverside and San Bernardino Counties to date (C. Campbell & L. Hanks, unpublished data). Because *H. rufiscutum* is a native parasite and is broadly distributed in California (Townes 1983), fortuitous host range expansion may provide additional mortality of *Phoracantha* throughout the state.

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